

Evaluation of a Apparent Diffusion Coefficient at Rectal Tumors

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Abstract

We were to estimate the apparent diffusion coefficient (ADC) values of benign and malignant rectal tumors, and evaluation of rectal cancer ADC depending on tumor grade, invasion beyond rectal wall and lymph node metastases. We evaluated MR data of 191 patients. According to pathomorphologic findings 159 patients with rectal cancer (adenocarcinoma) and 32 patients with benign rectal tumors (villous adenoma). Most of the malignant tumors were well-differentiated (37,7 %, n = 72) and moderately differentiated (36,6 %, n = 70), 8,9 % of rectal tumors were poor-differentiated (8,9 %, n = 17).

The value of ADC in benign tumors ($1,04 \pm 0,15 \times 10^{-3} \text{ mm}^2/\text{s}$) was significantly higher than that of malignant tumors ($0,70 \pm 0,12 \times 10^{-3} \text{ mm}^2/\text{s}$, $p < 0,0001$). ROC analysis showed strong correlation between ADC values and tumor malignancy (area under curve 0,959, $p < 0,0001$); cut-off value of $0,82 \times 10^{-3} \text{ mm}^2/\text{s}$ provided specificity of 100 % and sensitivity of 80 % in discrimination between malignant and benign tumors.

ADC value in T1-2 tumors ($0,75 \pm 0,12 \times 10^{-3} \text{ mm}^2/\text{s}$) was significantly higher than that in T3-4 tumors ($0,68 \pm 0,12 \times 10^{-3} \text{ mm}^2/\text{s}$, $p = 0,012$). The correlation was moderate (AUC 0,684, $p = 0,008$); the best results were obtained for cut-off value of $0,69 \times 10^{-3} \text{ mm}^2/\text{s}$ (specificity 69 %, sensitivity 61 %) as predictive of tumor invasion.

ADC provides effective differentiation between benign and malignant rectal tumors with cut-off value of $0,82 \times 10^{-3} \text{ mm}^2/\text{s}$. Correlation between ADC and tumor invasion beyond rectal wall was moderate. No correlation was determined between tumor grade and ADC values ($p > 0,005$) as well as tumors with and without lymph node metastases.

Key words: Apparent Diffusion Coefficient, Rectal Cancer, Magnetic Resonance Imaging.

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